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USE OF CERTAIN NEW MATERIALS IN THE CONTROL OF POTATO INSECTS IN MICHIGAN[2]

W. F. MOROFSKY AND J. H. MUNCIE[1]

Michigan State College, East Lansing, Mich.

Field tests of insecticides and fungicides were made at the Lake City Experiment Station during 1947 using the Menominee variety. The 19 spray plots consisted of four rows 180 feet long, randomized and replicated three times. The 15 dust plots consisted of eight rows, 200 feet long. All the yields were taken from four harvestings of the two center rows forty feet long in each plot. The soil was of clay loam and of irregular fertility.

Materials were applied at ten-day intervals throughout the season beginning with the 15th of July and continuing to the 19th of September. All plots were irrigated five times during the season.

The insect populations were extremely low during 1947. All insect counts were made 2-4-6 and 8 days after each application until the 19th

[2]The writers are indebted to Mr. A. M. Berridge, Superintendent. Lake City Experiment Station, for providing facilities for conducting this project, and to Mr. Dale Bray, Graduate Assistant in Entomology, for his assistance in making insect counts.

[3]Published as Journal Series No. 930 (n. s.) at Michigan State College, East Lansing, Mich.

[1]Associate Professor of Entomology and Research Professor of Botany and Plant Pathology, respectively.

TABLE 1.—*Insect control on potato spray plots, Lake City Experiment Station*—1947.

Materials	Potato Leafhopper				Six-Spotted Leafhopper				Flea Beetles				Tarnished Plant Bugs				Bus. Per Acre U. S. No. 1
	*2	4	6	8	2	4	6	8	2	4	6	8	2	4	6	8	
1. B. L. 40—DDT—F-48 (1 Pt.-1½-4-100)	1	1	4	1	5	34	7	5	1	1	2	0	0	2	4	4	205.6
2. DDT Alone (1½-100)	0	2	0	4	1	3	1	3	1	0	0	1	0	0	2	1	177.1
3. Dithane—Zn—L.—DDT Emul. 2 qt-1-½-1 Pt.—100)	3	0	1	6	0	4	2	4	0	0	0	1	1	0	0	0	217.0
4. Zerlate—DDT (2-1½-100)	1	3	0	1	0	3	1	4	0	0	0	1	0	0	0	1	202.7
5. Dethyl—COCS (1 Pt.-3⅓-100)	2	0	4	8	0	0	3	5	1	0	0	1	2	1	0	6	204.4
6. Persisticide—Orthex—Orth. 53)1 Pt.-1 Pt.-4-100)	0	3	2	2	0	6	8	2	0	0	0	0	1	0	0	6	229.8
7. Genicop—Filmfast (4-½-100)	1	1	1	5	3	2	1	1	0	0	0	0	2	1	0	5	215.5
8. Phenotox—Copper A (1-5¼-100)	4	3	1	4	0	3	2	2	0	0	1	2	2	2	4	0	214.2
9. Bord 8-4-100—DDT (8-4-1½-100)	1	2	2	3	2	8	1	5	0	0	0	0	0	2	5	3	192.2
10. Bord 8-4-100—BHC (8-4-3-100)	8	4	4	12	3	1	5	5	0	1	1	2	2	2	5	4	244.5
11. Check (No Treatment)	10	8	5	30	0	6	7	15	24	14	32	56	1	2	10	3	248.5
12. Z-78—DDT (2-1½-100)	2	0	3	4	7	3	3	2	0	0	0	2	2	1	0	5	237.8
13. Phygon—DDT (2-1½-100)	4	1	1	3	2	3	2	3	0	0	0	2	0	1	0	3	201.3
14. Parzate—DDT (2-1½-100)	2	2	2	6	3	2	2	5	0	0	0	1	1	0	1	2	233.4
15. (1) 3422—TBC (1.75-4-100)	0	3	2	5	1	3	2	4	0	0	0	0	1	0	0	1	208.1
16. 3422—TBC (2.5-4-100)	4	2	4	12	0	6	1	5	0	0	2	0	1	0	0	3	227.3
17. (2) 3422—TBC (1-4-100)	1	2	4	6	1	4	3	3	1	0	0	1	0	0	0	1	241.2
18. 3422—TBC (1.5-4-100)	2	0	6	11	1	4	2	7	0	0	1	0	0	0	0	1	208.2
19. Colloidal DDT—COCS	1	1	3	6	0	2	2	4	0	0	0	0	0	0	2	0	208.1

*Total counts made 2-4-6-8 days after application.
(1) 15 per cent Wettable 3422.
(2) 25 per cent Wettable 3422.

of September, when frost prevented further counts. Late blight was absent also and early blight on this variety showed a maximum of 15 per cent on the unsprayed checks.

Results of Insect Counts in Spray Plots

As previously stated, insect populations were extremely low and table 1 of the spray plots shows the combined counts made 2-4-6 and 8 days after applications throughout the season.

For potato leafhopper control, in general, DDT in either the 50 per cent wettable or 25 per cent in liquid form gave better results than did any of the other materials used, although this material varied greatly in its effect upon the six-spotted leafhopper.

Flea beetles were satisfactorily controlled by all of the materials used. Tarnished plant bugs were also effectively controlled by all insecticides used, with the exception of benzene hexachloride.

There is some indication (as shown in table 1) that where irrigation is used some spray materials seem to lose their efficiency after 6 to 8 days. This is shown by the increase in insect populations as given in table 1.

Results of Insect Counts in Dust Plots

Insect counts, as a whole, were more abundant in the dust plots than on the spray plots as shown in table 2.

Parathion (3422) 2 per cent + Tribasic copper gave the best control of potato leafhoppers whereas DDT 5 per cent + copper gave excellent control of the six-spotted leafhoppers. Somewhat variable results were obtained with all materials in the control of flea beetles and tarnished plant bugs, but DDT gave as good if not better control than did any of the other materials used.

Here again, as shown in table 2, there was a slight increase in insect populations after six days.

Summary

In the spraying and dusting experiments at the Lake City Experiment Station during 1947 insect infestation was not a serious problem. Most consistent control of potato insects in general was accomplished by applications of DDT in either sprays or dusts. Of the new materials used, Parathion 3422 as a dust was the most promising particularly in the control of the potato leafhoppers, whereas applications of 5 per cent DDT gave almost complete control of the six-spotted leafhoppers, flea beetles, and tarnished plant bugs. Benzene hexachloride, as a dust, ranked with DDT in the control of tarnished plant bugs and flea beetles. In the

TABLE 2.—*Insect control on potato dust plots, Lake City Experiment Station*—1947.

Materials[1]	Potato Leafhopper				Six-Spotted Leafhopper				Flea Beetles				Tarnished Plant Bugs				Bus. Per Acre U. S. No. 1
	*2	4	6	8	2	4	6	8	2	4	6	8	2	4	6	8	
1. TBC+DDT 3%+BHC 0.5%	1	3	9	10	1	8	9	6	0	0	0	3	0	0	2	0	176.0
2. TBC+DDT 3%	0	1	7	7	1	4	8	7	0	0	1	7	1	0	0	2	215.3
3. DDT 3%	1	1	5	18	3	3	8	6	0	0	2	5	2	0	1	0	221.1
4. Y. Cupro+DDT 0.5% Impreg.	1	6	6	16	5	4	9	9	3	3	11	50	0	0	1	3	286.4
5. Y. Cupro+DDT 1%+Pyr. (2) 0.06%	1	2	5	9	2	4	3	3	2	2	0	6	2	2	1	3	278.8
6. TBC+Nic. Conc. 2% DDT ¾%	5	1	5	9	1	2	2	3	1	0	4	9	0	1	2	0	288.4
7. TBC+DDT 5%	0	1	3	8	0	0	2	0	0	0	2	5	0	0	1	0	245.4
8. No Treatment	15	15	14	17	7	2	5	8	4	12	12	72	2	4	1	5	361.7
9. Copper-Lime+DDT 9%	2	3	5	7	3	0	1	1	0	1	5	10	2	2	0	9	304.0
10. TBC+3422 1%	1	7	11	16	1	1	0	4	2	2	9	11	1	2	0	4	357.9
11. TBC+3422 2%	1	0	3	5	0	2	1	5	2	1	1	6	2	2	1	1	324.2
12. TBC Cupro+DDT 1%+Py. (2) 0.12%	3	3	15	11	1	6	4	7	0	5	5	6	0	1	1	3	255.4
13. Z-78 6%+DDT 3%	0	2	3	9	0	2	4	7	0	0	2	3	0	0	0	2	276.9
14. Bordow+BHC 1%	1	6	12	21	0	6	9	10	1	3	2	3	0	0	0	1	232.4
15. Basicop+DDT 5%	3	0	5	16	1	2	6	5	0	0	0	1	2	0	0	1	242.4

*Total counts made 2-4-6-8 days after application.
(1) All Copper Materials at 7 per cent metallic.
(2) Pyr. Pyrethrins.

control of leafhoppers, however, benzene hexachloride in dust or spray combinations was not as effective as DDT. No late blight was present. There were no significant differences between materials in the control of early blight, because of the early killing frost.

As indicated in tables 1 and 2 where irrigation was used, an increase of insect populations was observed after six days in both the spray and dust plots. Insect counts were not correlated with yields of potatoes and the high yields of the untreated check plots can be attributed in great part to lack of serious insect infestations and diseases and also to the fact that the spraying and dusting equipment was not drawn through the rows where yields were taken.

FOREIGN POTATO INTRODUCTIONS

F. J. STEVENSON[1]

Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, United States Department of Agriculture, Beltsville, Md.

The introduction of new varieties or species of potatoes may not appear to be a plant-breeding procedure yet it is fundamental to a well-rounded breeding program. It is improbable that varieties will be found in foreign countries, with the possible exception of the Dominion of Canada, that are adapted to any of the potato-growing regions of the United States; but even if the new introductions cannot compete with the standard varieties they may carry genes for certain characters that will make them extremely valuable from the breeding standpoint.

The total number of accessions in the record books of the Potato Project exceeds 25,000. These include commercial varieties from our own and foreign countries, seedling varieties, and species. There are many duplicates, but several thousand different sorts have been collected during the past 35 years. Many of these were discarded either because they were thought to be of no value or because they were infected with virus diseases. In a number of instances the introductions showed disease symptoms when they were first grown in the field, and many others soon acquired various diseases and had to be discarded.

Since 1930 the Division of Plant Exploration and Introduction has brought into this country more than 700 varieties and species of potatoes. An expedition to Mexico in 1930, conducted by Paul Russell of that

division in cooperation with Donald Reddick of Cornell University, brought back about 68 lots of tubers and 3 lots of seed. A number of the lots were *Solanum demissum;* most of the others were *Solanum tuberosum.* These were taken to Cornell to be used by Dr. Reddick in his potato-breeding work, and a sample of each was turned over to the Division of Fruit and Vegetable Crops and Diseases. In 1932 another expedition was sent to South America. This expedition was led by C. O. Erlanson, representing the Division of Plant Exploration and Introduction, and H. G. MacMillan, representing the Division of Fruit and Vegetable Crops and Diseases. Of the collections sent in, 344 were given accession numbers. These were collected on the Island of Chiloe, from other parts of Chile, and in Peru and Bolivia. Those from Chile and Peru were sprouted in the quarantine greenhouse at Beltsville, Maryland, and the sprouts were shipped to Presque Isle, Maine. The collection from Bolivia was received too late to plant in 1932 but was planted in 1933.

In the 1932 report to all cooperators of the National Potato-Breeding Program it was announced that as soon as material of these introductions was available it would be distributed to the interested cooperating experiment stations to be tested for disease resistance and other desirable characters. In 1934 seed stock was requested and sent to F. A. Krantz, University Farm, St. Paul, Minnesota; to Donald Reddick, Cornell University, Ithaca, New York; and to J. H. Beaumont, University of Maryland, College Park, Maryland. None of the other cooperators requested any of the collection.

Cytological studies by F. J. Stevenson and C. F. Clark showed that the varieties from Chile belonged in the 48-chromosome group, but a number of those from Bolivia and Peru had 24 chromosomes as the somatic number. Tests and observations for disease resistance and other characters at Presque Isle, Maine, and Oakland, Maryland, and on what is now the Plant Industry Station, Beltsville, Maryland, did not reveal any outstanding traits that were not available in better-adapted varieties and seedlings.

The introductions that have contributed the most to the potato-breeding program are not the miscellaneous collections that have been made, but those that have been brought in for specific purposes. Dr. Reddick went to Mexico to get varieties of *Solanum demissum* some of which were considered immune to late blight. He has made good use of these in his breeding work, and although the first group of varieties he distributed to growers are not immune in the field, they are very

highly resistant and may be valuable to growers until immune varieties can be developed.

The blight-resistance program of the Federal workers was greatly advanced by the introduction of true seed of 10 crosses received in 1932 from K. O. Müller, Berlin-Dahlem, Germany. The seedlings were grown and sprayed with blight spores in the field at Presque Isle, Maine. Some of the seedlings were apparently immune to the physiologic races prevalent in Maine; others were very susceptible. None of them was desirable from the commercial standpoint, but a series of crosses was made between some of the best of them and selected seedlings and varieties. A few selections from this series showed the same reaction to late blight as that of the German parent, but showed a substantial improvement in yield and quality. The best of these were selected and crosses made to various varieties and seedlings. From this second series we have a number of selections that will compete with the standard varieties in yield and quality and that are highly resistant to blight in both vines and tubers. They are not immune, but in the tests in Maine they do not develop blight until they have made their crop and are approaching maturity, when some of the lower leaves will show small lesions. In contrast to these, the Green Mountain similarly inoculated is killed 30 to 40 days earlier, when its tubers are not much larger than a walnut.

The scab-resistance program in the United States was greatly boosted by the introduction of the varieties Arnica, Hindenburg, Richter's Jabel, and Hindenburg x Centifolia No. 9 and No. 15 These were received in 1934 from A. P. Lunden, Aas, Norway. All the scab-resistant varieties that have been distributed to growers, such as Menominee, Ontario, Seneca, and Cayuga, and a number that are now under test, inherited their resistance from one or the other of these varieties. Ostragis, introduced in 1935, and Ackersegen have also contributed to this part of the breeding program.

In 1935, the varieties Albion, Bevelander, Friso, Noordeling, Triumf, and West Brabander were introduced from the Institute for Plant Breeding, Wageningen, Holland, because they had shown resistance to leaf roll. Some of our most resistant lines inherited their reaction from Triumph. Crosses with Albion failed to give worth-while resistance. Friso was found to be resistant to ring rot. Also in 1935, 97 varieties were sent to us by the Institute of Plant Industry, Leningrad, Union of Soviet Socialist Republics. These were grown in Maine and observations were made of their various characters. They were very poor yielders.

In 1936, five varieties resistant to leaf roll were introduced from Scotland. These were Cardinal, Chance, Kepplestone Kidney, and Shamrock. A number of selections from a cross of Kepplestone Kidney x Earlaine showed resistance to leaf roll in the tests made by Donald Folsom at Highmoor Farm, Maine.

There is a demand in this country for varieties of potatoes with high dry-matter content. In fact, this character is closely associated with what is called good cooking quality. In an effort to increase, if possible, the dry-matter content, a number of so-called high starch producers were brought in from Germany and Holland. Among these were Ackersegen, Ostbote, and Starkeragis, which have been used as parents in crosses. In tests in Maine these have shown only a slightly higher dry-matter content than that of some of our best varieties and seedlings, and so far the progenies have been disappointing in yield and market qualities. The variety Calrose is an exception to this. It is a cross between Ackersegen and Katahdin. It was selected in Maine because of its resistance to late blight and sent to California where it proved to be a very high yielder if given plenty of irrigation water. It requires a long growing season, and has slightly yellow flesh. Another group of high starch producers has been introduced from Holland.

In 1939 another group of species and varieties was received from the Institute of Plant Industry, Leningrad, but aside from the fact that a few crosses were made with these they did not contribute anything to the potato-breeding work.

Only a few introductions were made during the war years, but in 1944 we received from D. F. McLeod of the Agricultural Experiment Station, Fredericton, New Brunswick, Canada, a large number of species and varieties from the British Empire Collection. Many of these were marked as diseased by Dr. McLeod, and still others were found to be infected with viruses. Some crosses were made, and seed was collected from a number of the self-fertile lots, but no serious effort has been made to maintain this collection.

The British have set up an institute for the purpose of collecting and maintaining potato materials from all parts of the world. One of their present objectives is to free the British Empire Collection from viruses and other diseases. If breeders are interested in definite species they can no doubt secure them from England or the Dominion of Canada through the Division of Plant Exploration and Introduction, Plant Industry Station, Beltsville, Maryland.

The latest introductions are 25 varieties released from quarantine on the 21st of November, 1947. One was sent to us by Carl Ross,

Bipartite Control Office, Food and Agriculture Group, Germany. It is a recently developed variety, claimed to be resistant to virus diseases; it is not stated which viruses. Three are selections from crosses made in Australia. Katahdin is the male parent of two of these, and U. S. D. A. Seedling 336-144 is the pollen parent of the other. The varieties Ulster Cromlech and Ulster Ensign are from Ireland. Nineteen varieties were obtained from the Netherlands.

A list of the countries from which we have received potato materials since 1930 would include Argentina, Australia, Bolivia, Canada, Chile, Cuba, Germany, Holland, Ireland, Java, Norway, Mexico, Peru, Philippine Islands, Russia, Scotland, Tasmania, and Uruguay.

The introduction of varieties and species of potatoes is not a one-way proposition. Since 1930 we have sent to foreign countries many varieties and seedlings. The requests have been plentiful throughout this period, but have increased since the war. Since 1943 we have sent material to Australia, Argentina, Belgium, Brazil, Canada, Chile, Colombia, China, Costa Rica, Cuba, England, Egypt, France, Guatemala, Haiti, Holland, Honduras, Iceland, India, Ireland, Italy, Mexico, New Zealand, Norway, Palestine, Poland, Portugal, Russia, South Africa, Spain, Sweden, Uruguay, Venezuela, and Yugoslavia.

Among the seedlings that have been sent to foreign countries from time to time, the U. S. D. A. Seedling 41914 has been selected and named Canus by the Agricultural Experiment Station, LaCombe, Alberta, Canada. The Australians are asking that U. S. D. A. Seedling 336-144 be named so that it can be certified and distributed to their growers. One of the seedlings from an unselected progeny has been named in Argentina.

In order to keep the cooperators in the National Potato-Breeding Program informed about the various introductions, we included in the earlier yearly reports references and lists of these foreign varieties. However, in the recent reports the lists have been omitted, but those engaged in potato breeding know that we maintain a number of stocks for use in the program, and we have always filled requests insofar as our material would permit. The severe leaf roll epidemic of 1938 eliminated a relatively large number of our breeding stocks in Maine, but we still have in our variety collection about 70 old and new American varieties and 29 European varieties. In addition to this we have a large number of seedling varieties that carry genes that are considered important in our present program.

A list of available genetic characters would include the following:

(1) wide adaptation; (2) variation in time of maturity from very

early to very late; (3) desirable shapes of tubers; (4) high yielding ability; (5) shallow eyes; (6) high dry-matter content; (7) field immunity from mild mosaic (virus A); (8) immunity from latent mosaic (virus X); (9) resistance to veinbanding mosaic (virus Y); (10) resistance in vines to leaf roll virus; (11) resistance in tubers to net necrosis caused by leaf roll virus; (12) resistance to yellow dwarf; (13) high degree of resistance to late blight in both vines and tubers; (14) resistance to scab; (15) immunity from potato wart; (16) resistance to ring rot; (17) to brown rot; (18) to blackleg; (19) to leafhopper injury; (20) to flea beetle injury; (21) to aphid injury; and (22) resistance to psyllid yellows.

The present official procedure in getting foreign introductions into this country is to make the request to the Division of Plant Exploration and Introduction, Bureau of Plant Industry, Soils, and Agricultural Engineering, United States Department of Agriculture. When tuber stock is brought in it is carefully inspected by the Division of Entomology and Plant Quarantine. If, after cutting the tubers, no visible disease is apparent the seed stock is planted in a quarantine greenhouse at the Plant Introduction Gardens, Glenn Dale, Maryland. The plants are examined from time to time for disease symptoms. If no disease is apparent they are grown to maturity and harvested. Part of the tubers are released to the person who requested the introduction and the remainder to the Potato Project of the Division of Fruit and Vegetable Crops and Diseases. These regulations may seem drastic to some people but the author is in favor of a strict quarantine after having seen some of the potato samples that have come from foreign countries. For example, a number of years ago an inspector found potato wart on some samples that had been collected in South America. Those on which the disease was found were immediately consigned to the incinerator; the others were grown in the quarantine greenhouse, since no one could be certain that all the tubers infected with wart had been picked out, and we were unwilling to take them to the field for increase until the plants produced from the foreign tubers could be carefully inspected for disease symptoms.

At present there is much talk about collecting and preserving genetic material for future breeding work. This is a worth-while project and should be undertaken without delay while there is still a wealth of material in South America and other parts of the world. However, if the greatest use is to be made of the introductions, a special organization should be responsible for their maintenance and study. The work should not be left to the plant breeder. He will maintain the

relatively few lines that are necessary to meet the objectives of his program and will discard whatever seems to be of no use to him or his associates, at present, or in the near future.

The new organization should be provided with facilities and personnel to:

1. Maintain the stocks as free from disease as possible, by growing them in isolation, by tuber indexing, by roguing, and by early harvesting.
2. Ascertain from others or from personally conducted tests the disease reactions of the various lines.
3. Study the plant characters and write complete descriptions of the lines that are to be maintained.
4. Study the lines cytologically.
5. Study their flowering habits and their pollen production.
6. Study the crossability of the various species.
7. Self the self-fertile varieties and species and keep a supply of seed under optimum conditions for maintaining its viability.
8. Make germination tests of seed from time to time and renew the supply of the lots that show reduced viability.
9. Publish lists of varieties and seedlings with their important class characters.
10. Distribute tubers and seed to those requesting it.

Summary

Thousands of varieties and seedlings of various species of potatoes have been introduced to this country during the past 35 years. Since 1930, two expeditions under the direction of the Division of Plant Exploration and Introduction have explored parts of Mexico and South America. Many smaller lots have been introduced from time to time. These included seed or tubers of the most promising sorts reported in the literature, seed and tuber stock of varieties and species carrying genes for resistance to late blight, varieties resistant to scab and to leaf roll, and varieties reported to be high in dry-matter content. These have contributed much to the plant-breeding program. They have been introduced from a relatively large number of countries. Since 1943 the United States Department of Agriculture has sent potato stocks to 34 foreign countries.

A list of available genetic characters is given. The present official procedure in getting foreign introductions into this country is described.

Recommendations are made for the organization of an institute whose sole objectives would be the introduction of potato material, its maintenance, and certain studies relating to its possible usefulness.

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[1]Principal Geneticist.

OBSERVATIONS OF APHIDS ON POTATOES IN NORTHERN WISCONSIN, 1947

C. M. Voss and Floyd Andre

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The potato aphid, *Macrosiphum solanifolii* (Ashm.), and the green peach aphid, *Myzus persicae* (Sulz.), are important pests of potatoes in the seed-producing areas of northern Wisconsin. Since both species are vectors of plant disease, the desirability of keeping them from building up in epidemic proportions on potatoes is particularly significant. Studies on their biology and control have been underway for several years.

Field Observations in 1947

Due to the wet season in the Rhinelander area, potatoes were planted somewhat later in 1947 than usual. The first potato plants appeared the second week of June. In the meantime the potato aphid was observed to be multiplying on several of its weed hosts in the area, especially on campion or cockle weed. From the middle of June to the first week in August steady flights of these aphids occurred and representative samples were collected in 7 wind screen traps placed at various locations throughout the area. Apparently, the earlier flights were from host plants such as campion since a high percentage of winged forms were observed developing on them.

Potatoes were not infested with winged aphids until several days after plant emergence. Our counts indicated that in some fields all plants were infested during the first month of plant growth. Throughout July and early August, regardless of the spray program, all leaf counts indicated relatively high numbers of aphids on several fields of early potatoes in the area. Parasites and predators were also numerous but the aphid population did not decline until after two weeks of hot, dry weather in early August when the temperatures reached 99° F. The remaining nucleus of aphids was maintained on the lower leaves of the plant and in early September increased to high numbers in all fields observed, including later plantings of potatoes.

Data were taken in eleven fields treated with DDT wettable powder in Oneida and Vilas counties to observe the aphid population trend. These counts were taken during July, August, and September. The relatively high numbers of potato aphids in relation to other insects are shown in table 1. Early in August aphids decreased as a result of high temperatures. The number of aphids built up again in September when the weather became cooler.

TABLE 1.—*Insect counts taken from sweeps of eleven potato fields treated with DDT wettable powder near Rhinelander, Wisconsin,* 1947.

Month	Numbers per 100 Sweeps*					
	Potato Flea Beetle	Potato Leafhopper	Six-spotted Leafhopper	Tarnished Plant Bug	Potato Aphid
July	17.6	10.9	6.3	11.0	81.0
August	129.0	13.4	24.0	7.9	48.5
September	16.4	9.6	6.4	8.4	131.5

*Average based upon a total of 6,580 sweeps taken on random dates during this three-month period.

The total aphids counted during July and August from sweeps of two fields sprayed with calcium arsenate amounted to nearly the same number as those from the DDT-sprayed fields.

These counts, although relative, indicate that the DDT wettable powder as used in the growers' spray program was not controlling the plant lice. Even though not present in epidemic numbers this summer, the aphids were numerous enough to prove serious from the viewpoint of the dissemination of virus diseases.

Control Tests in the Field and Laboratory

Of several insecticides tested against the aphids on potatoes during the summer of 1946, a new material, hexaethyl tetraphosphate, proved particularly effective.

Laboratory tests were conducted during the fall and winter of 1946-1947 to determine the relative toxicity of different dilutions of this and tetraethyl pyrophosphate to the potato aphid. It was found that hexaethyl tetraphosphate at 1-3200 dilution (¼ pint per 100 gallons) gave good control when sprayed directly on the aphids. Tetraethyl pyrophosphate proved more effective since good kills were obtained at dilutions ranging to 1-6400 in this experiment.

Other tests were conducted in the greenhouse to compare wettable DDT powder with the oil emulsion form. The results indicate a greater kill from the DDT-oil emulsion both as a residual poison and as a direct spray on the aphid.

These materials were compared in various concentrations in the field during the summer of 1947. DDT-oil emulsion was applied on four fields throughout the season alongside an equivalent amount of DDT in 50 per cent wettable powder form. Counts taken after each spray application showed about twice as many aphids on potatoes treated with the DDT wettable powder. Tests with single applications of insecticides were conducted on various fields found infested with potato aphids. In table 2 are shown the results obtained from three fields treated on the 25th and the 28th of July, 1947. The materials were applied at the rate of 125 gallons per acre with an 8-row 400-gallon power sprayer operating at 400 pounds pressure. The counts from fields A, B, and C indicate that the DDT-oil emulsion used at the higher concentration gave better control. The relatively low kill of aphids in fields A and B indicates that TEP is not compatible with Bordeaux mixture. Best control was obtained with this material when used with tribasic copper sulphate fungicide in field C. It should be noted that DDT in combination with tribasic copper sulphate does not show so wide a range of difference between the wet-

TABLE 2.—*Number of potato aphids collected from sweeps in three fields treated with five formulations of insecticide.*

Material (Amounts per 100 gallons)	Field A—Triumph Potatoes Bordeaux, 10-5-100				Field B—Chippewa Potatoes Bordeaux, 10-5-100			Field C—Chippewa Potatoes Tribasic Copper Sulphate, 4.5 lbs.-100		
	24 hr.[1]	3-day	5-day	Total	3-day	5-day	Total	3-day	5-day	Total
1 lb. 50% wettable DDT	135	189	174	498	66	89	155	63	111	174
2 lb. 50% wettable DDT	194	171	103	468	29	123	152	51	55	106
1 qt. DDT oil[2]	80	98	66	244	28	22	50	53	73	126
2 qt. DDT oil	24	33	30	87	10	10	20	28	39	67
¼ pint 100% tetraethyl pyrophosphate[3]	119	97	110	326	49	52	101	5	9	14

[1]Represents a total of 32 sweeps or 16 sweeps from each of the treated field.
[2]One quart contains ½ pound actual DDT. Supplied by the Shell Oil Company.
[3]Supplied by the Victor Chemical Company.

TABLE 3.—*Comparative numbers of aphids taken in sweeps and leaf counts from a field of Cobbler potatoes treated with eight formulations of insecticides.*

Materials (All contained 5 pounds Tribasic copper sulphate except where designated)	Numbers from Lower Leaves[3]			Totals from Top and Middle Leaves[4]	
	Potato Aphid	Green Peach Aphid	Total	All Potato Aphids	Total Aphids from Sweeps[5]
½ pint HET[1]—no fungicide	40	2	42	8	11
½ pint HET	43	19	62	16	27
1 pint HET	25	0	25	7	13
¼ pint tetraethyl pyrobase—no fungicide[2]	73	21	94	23	24
¼ pint tetraethyl pyrobase	71	6	77	33	41
½ pint tetraethyl pyrobase	69	19	88	23	23
2 quarts DDT-oil emulsion	25	1	26	10	10
3 quarts DDT-oil emulsion	17	0	17	13	10
Check—no treatment	107	11	118	99	63

[1]Hexaethyl tetraphosphate (100 per cent). Supplied by Victor Chemical Company.
[2]Tetraethyl pyrobase containing 40 per cent tetraethyl pyrophosphate. Supplied by the Victor Chemical Company.
[3]Represents the numbers from 20 lower leaves counted per material 48 hours after treatment.
[4]Represents the total number of aphids counted from 40 leaves per material or 10 random leaves from each end of the two replicates.
[5]Counts from 64 sweeps or 32 from each replicate 48 hours after treatment.

table and oil emulsion formulations as it does when used with Bordeaux fungicide. Perhaps the masking effect of Bordeaux is more pronounced in reducing the effectiveness of DDT when in the wettable powder form than when in an oil emulsion.

Regarding the other insects on potatoes the DDT-oil emulsion gave control similar to that of the DDT wettable powder.

Early in September a test was applied to a field of Cobbler potatoes infested with the potato aphid and the green peach aphid. The materials were applied at the rate of 125 gallons per acre to two replicates of eight rows each randomized through the field. Forty-eight hours after treatment, leaf counts of 15 random leaves were taken from each end of the two replicates giving a total of 60 leaves examined per material. Sweeps with an insect net were also made and the aphid numbers recorded in table 3.

These results emphasize the problem of obtaining a satisfactory kill of the aphids on the lower leaves. The counts from the lower leaves, although less than the check, do not, in general, indicate a good control. For the purpose of determining the effectiveness of the several materials in this test the comparison is based on sweeps and leaf counts from the upper and middle portion of the plants. The same relationship between the various sprays appears to exist in both the counts and the sweeps. The hexaethly tetraphosphate and pyrobase materials gave the best control when not in combination with the tribasic copper sulphate. The addition of this fungicide appeared to decrease the toxicity of these two insecticides. The DDT-oil emulsions ranked close to the hexaethyl tetraphosphate in control.

From a practical viewpoint there are several considerations that must be kept in mind with reference to the polyphosphates. Both field and laboratory tests in Wisconsin indicate that these materials are effective for the control of the potato and green peach aphid. Their compatibility with fungicides and insecticides needs careful study. The proper timing of sprays, correct formulations, and immediate application following the preparation of the spray mixtures are important.

Results from field trials during 1947 indicate that even though high aphid kills are obtained with sprays applied early in the season, some aphids remain. From these and migrating winged forms large numbers develop if control practices are not continued later in the season. In some instances it may be necessary to incorporate this insecticide in several sprays. This would increase spraying expense since DDT would also be essential for the control of other pests.

It might be more practical for the potato grower to use DDT-oil

emulsion with the thought in mind that this material may satisfactorily control aphids as well as the other insects present. Preliminary results indicate that it is compatible with most fungicides; that the toxicity does not decrease shortly after mixing and applying but leaves a poisonous residue on the leaf surface; that it controls the aphids on potatoes better than wettable DDT powder; and that it is equivalent to wettable DDT for the control of other insects such as flea beetles, leafhoppers, and plant bugs.

SUMMER MEETING OF THE POTATO ASSOCIATION OF AMERICA

The Potato Association of America will hold a summer meeting jointly with the Plant Breeding, Seed Certification and Plant Pathology Groups at Presque Isle, Maine, August 19 and 20, 1948.

You will note from the following tentative program that many timely and important topics will be discussed.

GENERAL MEETING
August 19, 1948

9 A. M. New Potato Storage House, Aroostook Farm
Greeting Dr. Fred Griffee, Director, Maine Agricultural Experiment Station
Purpose of Conference—E. L. Newdick. President Potato Association of America

10 A. M. Study of Variety and Disease Plantings
1. Breeders—Robert Akeley—Leader
2. Pathologists and Certification Officials—Dr. Reiner Bonde—Leader

12:30 P. M. Lunch

2 P. M. Study of Variety and Disease Plantings, with leaders Aroostook Farm

6:30 P. M. Dinner (Guests of Maine Certified Seed Growers)

7:30 P. M. Evening Conference
Sound Film, "Certified Seed in Maine"
Speakers: A. K. Gardner, Commissioner of Agriculture, State of Maine
William H. Martin, Editor, American Potato Journal

August 20, 1948

9:00 A. M. Study of Variety, Disease and Foundation Plantings

12:30 P. M. Lunch

1:30 P. M. Visit to Potato Storages, Alcohol Plant, Starch Factory and Seed Fields in Canada, for those interested
Further study of Variety and Disease Plots, for those desiring to continue inspection

This is your invitation to inspect, with leading specialists, the many new potato seedlings and varieties as well as most of the known potato diseases. Seed Certification personnel, Potato Breeders and Plant Pathologists are especially invited to attend.

Accommodations will be taxed to capacity. so make your reservation early.

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MORE POTATOES PER ACRE

TENNESSEE TRI-BASIC COPPER SULPHATE

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For control of Early Blight and Late Blight use Tennessee Tri-Basic Copper Sulphate or Microgel. Marked increases in yield are shown due to the efficiency and safety of these fungicides in the control of these diseases. Growers find that these superior fungicides when used according to directions, greatly increase their yields. Control these diseases with Tennessee Tri-Basic Copper Sulphate or Microgel for healthier plants and increased production. May be mixed with D.D.T. for Leaf Hopper and Flea Beetle Control.

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That Tennessee Tri-Basic Copper Sulphate be used when buying Copper dust or Spray Mixtures.

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SECTIONAL NOTES

Maine

E. L. Newdick, President of the Potato Association of America is making every effort for the members of the Association to see the Aroostook potato industry at its best when they attend the field meeting on the 19th and 20th of August. The program is planned so that those who attend can get the most from the conference. A swing through the county is planned for those who would like to see the industry in all its phases.

The season is somewhat backward. Although our planting operations were finished at an early date, rains slowed things up, and the relatively cool weather during June has set the crop back. Spraying and roguing are a couple of weeks behind. The stand of potatoes is rather poor, due to the fact that the low areas in many of the early-planted fields have been drowned out. Conditions are somewhat worse than usual but despite these conditions every one is anticipating a good crop.

A survey by the P. and M. A. indicates that 81 per cent of the potato acreage in 1947 was planted from certified seed plot stock. In view of the Blue Tag Certified Seed campaign, sponsored by all agencies this year, indications are that about 90 per cent of the acreage was planted with certified seed in 1948. Reports reaching us from other states show that Maine seed has the lowest virus content in history. This proves that the Florida tests last winter were very accurate.

E. L. Newdick reports that the following certified seed entries have been made: Katahdin, 38,728; Chippewa, 11,782; Green Mountains, 8,556; Cobblers, 7,027; Sebagos, 2,878; Mohawk, 388; Russet, 213; Houma, 159; Bliss Triumph, 136; Sequoia, 106; Pontiac, 56; Warba, 19; Teton, 11; Pawnee, 6; Ontario, 4; Kennebec, 1½. It is apparent that the figures for the Foundation Seed Farm owned by the Maine State Seed Potato Board are not included in this acreage for they would have some Kennebecs on the farm which they purchased for the purpose of multiplying disease-free stock.

The industry has followed Congressional action very closely and farmers believe that the long term agricultural program as it relates to potatoes means stabilization for the potato industry.—(Verne C. Beverly.)

Michigan

Michigan's acreage of table stock this year is somewhat lower than last year. A greater acreage of the table stock has been planted with certified seed this year than in previous years.

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Bumper Yields and Better Quality Potatoes

Through complete insect control and blight protection by the use of

C-O-C-S NIATOX DUSTS

containing 2, 3 or 5% DDT plus copper oxychloride sulphate

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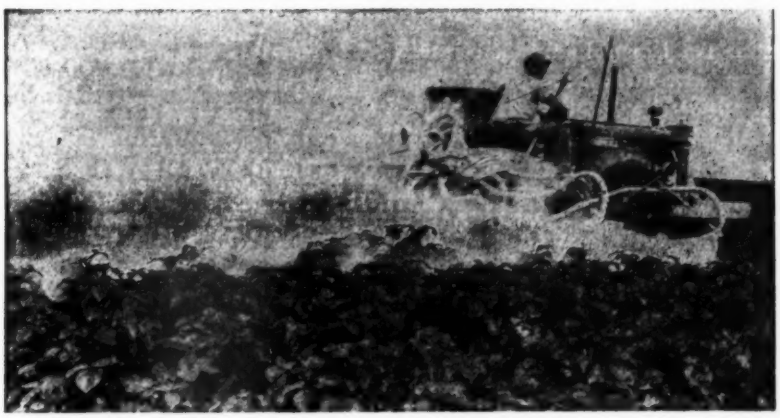
NIATOX CROP SPRAY

a micro-milled 50% DDT wettable powder



For economical, time-saving applications, these sturdy and dependable Niagara crop dusters are available: 24 nozzle Cyclone dusters, Dri-Fog dusters, Cropmaster dusters and Model AA Tractor Take-off Dusters. For wireworm control, ask your dealer for Niagara BHC (Benzene Hexachloride) materials. *"When you buy Niagara, you buy protection."*

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The certified seed acreage listing is not yet completed. However, indications are for about the same seed acreage as last year.

Our planting season varied from a week to ten days earlier than normal, and our plants are off to a very good start. The weather has been very favorable to date with sufficient rains, except in a few areas. Growers, who irrigate, have not had to apply water as yet.

Indications are that several of our Michigan people plan to attend the summer meeting of the Potato Association of America at Presque Isle, Maine, on the 19th and 20th of August.—(H. A. REILLEY.)

NEW JERSEY

Irish Cobblers are now being harvested throughout the state. The yields being obtained are more or less variable because of the heavy leaching of fertilizer in some of the lighter soils, and perfectly normal growth in other fields. The quality is good and very little rot is present. Late blight has not progressed very much not only because of thorough spraying, but also because we have experienced much better weather conditions.

The practice of digging immature potatoes, employed by too many growers, is being strongly opposed not only because of the effect of "green" potatoes on the market but because the increase in yield obtained,—providing the potatoes are allowed to mature,—will usually far exceed the slightly higher price received for the early harvested potatoes. In a survey made with the Katahdin variety from 1944 through 1947, weekly harvestings from three farms indicated that on the average potato yields would increase 23 per cent or 41 sacks of U. S. One's between the time 50 per cent of the leaves were dead and maturity (this includes one field which was harvested when only 72 per cent of the leaves were dead.) The yield increased 48 per cent or 93 sacks of U. S. One's in one field in 1947, and in another field in 1946 the yield increased 82 sacks or 57 per cent after 50 per cent of the leaves were dead. In years of relatively high rainfall and normal temperatures during July and August, a much greater yield increase would naturally be expected than in years when rainfall is deficient and temperatures are very high during these months.—(J. C. CAMPBELL.)

NEW YORK

Because of a very wet spring, planting was continued until after the 1st of July; two weeks later than usual.

Our early-planted potatoes have shown a vigorous growth, and a good start and promise of a good crop. The vine growth is heavier than in some sections south of us which were planted a month earlier.

For a More Profitable Crop

...when you're ready

Kill Potato Tops with

AERO* CYANAMID,

SPECIAL GRADE

Set up your own potato crop timetable; plan your harvest for the most opportune time. Then, ten days before you want to dig, just dust on 75 to 125 lbs. of AERO Cyanamid, Special Grade, per acre. It kills tops gradually and completely, hastens maturity of potatoes, speeds up digging and picking because it leaves a *clean* crop. Potatoes are firmer, fully matured—all ready to be shipped or stored before late blight can threaten.

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As previously announced, the Empire State Potato Club will hold its Summer Field Day on the 12th of August at the Hopkins Farms at Pittsford. When you scan the list of entries it is easy to visualize that potato growing is rapidly becoming mechanized. More new machinery is listed than ever before. Many of these new models have not as yet been catalogued. The Field Day, with its demonstrations, offers an opportunity to see the latest machines a year in advance of production.

Besides our own Field Day many growers are planning tours to other sections during the summer to improve their own methods and appreciate the problems of other potato growers.

New York growers are carefully watching the developments of the Marketing order in Virginia and North Carolina in an effort to figure out what might happen under local application. No new efforts are being made, however, to promote Marketing Agreements as yet—(H. J. Evans.)

Oregon

The potato fields in Klamath Basin are looking better on the average than ever before. The basin has never planted better seed. Our stands are very good, and there has been very little seed piece rot. Our plants are also making a very good growth. There has been no frost injury to date,—the 4th of July.

The acreage totals vary somewhere between 17 and 18,000. If we have a normal season from now on, we should have a very nice crop.

Considerable acreage is being dusted or sprayed with DDT for aphid control.

The Marketig Agreement Control Committee members and alternates held their Organization Meeting here on the 13th of July.—(Walt Jendrzejewski.)

South Carolina

Our 1948 potato crop is now history that is not very pleasant reading. Approximately one-third of the acreage was abandoned when excessive rains rotted the seed. The yields on the remainder varied from good to poor. The tuber size was smaller than normal. However, the quality in the early crop was better than anticipated. The quality of the late harvestings was very disappointing. Late blight and southern bacterial wilt took heavy tolls in many fields.

Because of the flooded markets a large portion of the crop was moved through the government purhase program. No potatoes had to be dumped as in former years.

The washing program, started on a large scale last year, paid off again. At times when there was no sale on the unwashed potatoes the

MODEL PB-3 WEED BURNER

The Model PB-3 is here shown in use in potato fields. Used to destroy green immature vines it permits harvesting operations without waiting for normal maturing of vines or their elimination by killing frost.

Vegetation which has accumulated after cultivating is no longer possible, is completely eradicated and permits efficient digger operation. Clean fields result in fewer potatoes being lost as they can easily be seen by pickers.

The use of the Model PB-3 is not restricted to the burning of potato vines as it can be used wherever weed eradication is necessary.

At a speed of 5 m.p.h. the Model PB-3 consumes 18 gallons of fuel oil per acre and burns 4 rows or a swath 15 feet wide on each trip.

References by potato growers using the Model PB-3 furnished on request. They will give you their actual experience with the use of this machine.

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washed product was in demand on a cash F.O.B. basis and at a premium above suport price. One interesting feature of the purchase program was that growers would sell to it rather than to commercial buyers because the latter demanded safe delivery on terminal markets whereas the other was on a F.O.B. basis. The final result was that orders on unwashed potatoes frequently went begging.—(W. C. BARNES.)

SOUTH DAKOTA

The potatoes in South Dakota look excellent at the present time. Many of the fields have been laid by and have been inspected for the first time. More than 6,700 acres have been entered for certification and there are still a few late applications to be sent in.

Dr. C. E. Rosenquist from the Botany Department of Nebraska University, is assisting with the field inspection this summer.

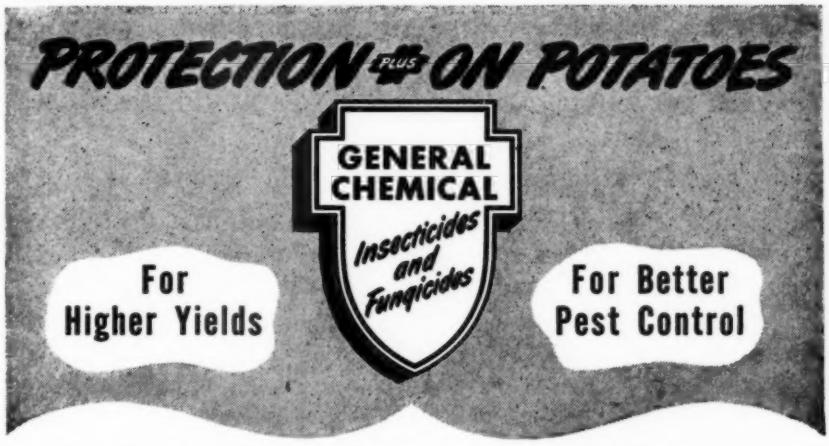
The committee members were nominated for the committee to administer the potato marketing agreement program and we expect to receive an announcement of their selection very soon, from Washington. The area which will be covered by the marketing agreement includes six counties in the northeastern part of South Dakota where the bulk of the commercial potato acreage is planted.

Our growers expect to start digging early this year—probably between the 10th and 15th of August. The tubers in the early-planted fields are now large enough to be used as new potatoes.—(JOHN NOONAN.)

WASHINGTON

Our potatoes in the State of Washington are making a very rank growth, although they are about three weeks later than they should be in a normal year. So far growers are finding that tuber production is slow but this is expected to improve since we have had warm sunny weather the last two weeks. The crop is quite free from disease up to the present time despite the fact that we have had an unusually wet spring. Traces of early blight are showing in most of the commercial fields on the bottom leaves but no damage is being done by this fungus. So far no late blight has appeared and only an occasional hill shows black leg.

Virus diseases are less prevalent than usual in most of the fields at the Moses Lake area. We have a new trouble here which has been designated by some as late-breaking leaf roll. It resembles quite markedly what eastern growers know as purple top. In varieties which do not have the coloring matter, the trouble has a yellowish cast rather than a purple one. Fields which show no disease at all until after the flower buds appear may be one hundred per cent infected with this trouble



25% DDT Emulsifiable Oil Concentrate

GENITOL* EM-25

Made for easy, convenient mixing with water, especially for spraying potatoes. Genitol EM-25 has proved effective at economical dosage in control of Colorado potato beetles, aphis, flea beetles and leaf hoppers. It may be used in combination with neutral copper fungicides, such as General Chemical Spraycop, for combined control of insects and blights.

50% DDT Spray Powder

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Particles of Micron Fineness

A 50% DDT wettable powder, especially milled for finest particle size. Poured directly into agitated spray mixture, Genitox S50 mixes completely in hard or soft water, obtaining quick wetting and dispersion without excessive foaming. Because it is especially processed to stay in fine flocculated suspension, Genitox S50 provides highest possible deposits of the DDT material, in a uniform spray cover on foliage, with only minimum run-off of the insecticide. Unexcelled for control of potato insects mentioned above. May be used with neutral copper fungicides.

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DDT-Basic Copper Concentrated Spray Powder

GENICOP* SPRAY POWDER

Micron-Fine Particles

A combination of 25% pure DDT and 73% Basic Copper Sulfate with special conditioning and depositing agents, providing excellent coverage and all-around spray efficiency. This concentrated insecticide - fungicide offers economy and time-saving convenience for combined control of early and late blights, Colorado potato beetles, aphis, flea beetles, and leaf hoppers—in one material.

Neutral Copper Fungicide Spray Powder

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A specially processed neutral copper fungicide of unusual chemical stability, high in copper content, for control of early and late blights. Outstanding for fungicidal effectiveness.

FOR DUSTING: Ask about General Chemical's Copper Dusts and DDT Dusts to suit every insect and blight problem on potatoes.

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ORCHARD BRAND SPRAYS & DUSTS

before being harvested. So far as we know, the yield is not reduced appreciably and no net necrosis has appeared.—(M. R. HARRIS.)

PROVINCE OF ONTARIO

The condition of our potato crop is reported as "good" to "excellent" in practically all counties and districts throughout the Province. Flea beetles have been abundant, but good control has been experienced where DDT has been used according to recommendations either in spray or dust forms. Leafhoppers are beginning to attack in some areas, and growers have been warned to be on guard against these destructive insects. It is expected that an increased number of growers will properly apply copper fungicides this year to control blight.

New potatoes are now being marketed in volume with excellent quality, available to consumers. Commencing the 1st of July, control of potato sales grown in the counties of Essex and Kent, and in the township of Adleborough in Elgin was vested in the Southwestern Ontario New Potato Marketing Board under the terms of the Farm Products Control Act. In essence, the scheme forces the sale of potatoes in the prescribed area through the designated agencies, and came into effect as the result of a recent vote of potato growers in the area mentioned. Prices quoted on the Toronto market (July 8th) for Canada No. 1 grade were: $3.25 to $3.50 per 75 pound bag, on a wholesale to retail basis.

Harvesting of the intermediate crop throughout Central Ontario is expected to be earlier than usual this year, with substantial quantities being available early in August.

There is a keen interest in the scab investigational project, and many growers are anxious for results of practical value.—(R. E. GOODIN.)

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with a guaranteed fineness of 99½% passing a screen having 105625 openings per square inch. It contains magnesium and calcium. Insures greater coverage and yields.
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ORIGINATORS OF Geigy DDT INSECTICIDES

GEIGY'S E 25

—an emulsifiable solution containing 25% Geigy DDT (by weight) for use in the preparation of sprays for crop protection.

GESAROL AK 50

—a finely-ground, wettable powder containing 50% Geigy DDT especially adapted for use in making sprays to control potato and orchard pests.

GESAROL VD 50

—a finely-ground powder containing 50% Geigy DDT—used by your local mixer in making 3-5% DDT dusts for general agricultural use. When buying dusts from your dealer, look for the GESAROL VD 50 seal on the bag.

GY-COP "53"

—a chemically stable, insoluble basic copper sulphate with a guaranteed metallic copper content of 53%. Used in sprays or dusts to control early and late blight.

POTATO VINE AND WEED KILLER

—applied at the rate of 1 gal. in 100 gals. of water to quickly kill potato vines so tubers may mature and digging is easier.

GEIGY LEADS THE FIELD WITH 9 YEARS OF EXPERIENCE IN COMPOUNDING EFFECTIVE DDT INSECTICIDES.

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Potato Digging at Its Very Best

HERE is potato digging at its very best. The camera shows, better than words can tell, the clean job of separation being done by the one-man-operated John Deere Two-Row Level-Bed Digger.

The important thing the camera doesn't show is the bruise-free condition of the potatoes as they come off the long, low, level separating apron. It is this gentle but complete separation that has caused this digger to be referred to as the "extra bonus" digger. Wherever it is used, it invariably means a higher market price for the crop.

Be sure to ask your John Deere dealer about the availability of this latest-type, money-making digger. It is built in one- and two-row sizes with all the latest features, including heavy-duty power drive, safety release clutch, positive power lift, and long-lived elevator chain.

Write John Deere, Moline, Illinois, Dept D, for special free folder describing the new John Deere Double Level-Bed Digger which eliminates the trash problem when digging two rows. Also special folder on John Deere Angle-Bed Diggers.

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Keep your potatoes sprout-free and firm

Potatoes dusted with BARSPROUT* Sprout Inhibitor remain firm and farm-fresh in storage. Because sprouting is retarded, moisture and weight losses are overcome. BARSPROUT-treated potatoes can be held at temperatures which avoid accumulation of reducing sugars.

Whether potatoes are for table stock, chips or frozen packagings, BARSPROUT treatment offers many advantages. The cost, pennies per bushel, is more than paid for by the elimination of weight loss caused by sprouting. Treated potatoes are preferred by processors, merchants and consumers.

Sizes to meet every need available from your supplier.

Specific information on how BARSPROUT can help you will be promptly supplied. Please write stating the quantity of potatoes you store and the market you supply. There is no obligation.

*Trademark

American Cyanamid Company

Agricultural Chemicals Division

31-A Rockefeller Plaza • New York 20, N. Y.

Branch Offices: 628 Dwight Building, Kansas City 6, Mo.
Brewster, Fla. • 1207 Donaghey Building, Little Rock, Ark.
111 Sutter Street, San Francisco 4, Calif.

IT PAYS TO WATCH GROWING PLANTS

Growing plants should be observed closely for signs which may denote plant-food starvation. Potatoes, for instance, will show their need for potash with leaves that have an unnatural, dark green color and become crinkled and somewhat thickened. Later on, the tip will become yellowed and scorched. This tipburn then will extend along the leaf margins and inward toward the midrib, usually curling the leaf downward and resulting in premature dying.

It pays to watch for these signs, but it is a far better practice never to give them a chance to appear. They are signs of extreme potash starvation and long before they appear, the potash content of your soil may be so low as to greatly reduce the yield and quality of your crop. Consult your official agricultural adviser or experiment station about the fertility of your soil. See your fertilizer dealer. He will show you how little extra it will cost to apply enough potash for greater returns on your investment.

●

Write us for additional information and free literature on the practical fertilization of your crops.

American Potash Institute, Inc.

1155 Sixteenth St., N. W. **Washington 6, D. C.**

Get greater returns of uninjured potatoes with...

IRON AGE *Kid Glove* DIGGER

GROWERS who use them know that Iron Age Kid Glove Potato Diggers are their most important crop insurance. Kid Glove is especially designed to handle *more* potatoes with *less* injuries than any other on the market. Mechanical injuries to tubers are almost non-existent in the Kid Glove because the rugged, durable elevator apron with wood crossbars acts as a cushion for the potatoes.

Kid Glove construction permits use of continuous apron drive entirely from the rear. The apron drive sprockets at the extreme rear pull apron full separating distance, eliminate chain "buckling."

Iron Age builds Kid Glove Diggers in one and two row models . . . 27-inch and 60-inch widths. Economical to own and operate, either model may be furnished with or without a transmission. If you are interested in increasing your crop yields and profits by getting more *uninjured* potatoes per acre, see your nearest Farquhar Iron Age Dealer about Kid Glove—or write to:

A. B. Farquhar Company, *Farm Equipment Division* 3301-U Duke St., York, Pennsylvania.

PLANT AND SPRAY THE IRON AGE WAY

Farquhar
IRON AGE
YORK, PA.

POTATO AND VEGETABLE PLANTERS • TRANSPLANTERS
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